



UPDATED

TRAFFIC NOISE IMPACT ASSESSMENT

PROPOSED PRECINCT 4 (ROL 1) DEVELOPMENT

YARRABILBA

PLANS AND DOCUMENTS
referred to in the PDA
DEVELOPMENT APPROVAL



Approval no: DEV2017/860

Date: 17 June 2021

Prepared for:
Lendlease

Prepared by:
MWA Environmental

19 February 2021

Max Winders & Associates Pty Ltd tas MWA Environmental
Level 15, 241 Adelaide St, Brisbane GPO BOX 3137, Brisbane Qld 4001
P 07 3002 5500 **F** 07 3002 5588 **E** mail@mwaenviro.com.au
W www.mwaenviro.com.au
ABN 94 010 833 084

DOCUMENT CONTROL SHEET

MWA Environmental	
Level 15 241 Adelaide Street	
GPO Box 3137 Brisbane 4001	
Telephone: 07 3002 5500	Job Name: Yarrabilba
Facsimile 07 3002 5588	Job No: 17-051
Email: mail@mwaenviro.com.au	Original Date of Issue: 19 February 2021

DOCUMENT DETAILS

Title:	Updated Traffic Noise Impact Assessment – Proposed Precinct 4 Development, Yarrabilba		
Principal Author:	Mr Elton Singh		
Client:	Lendlease		
Client Address:	GPO Box 2777, Brisbane QLD 4001		
Client Contact:	Mr Kelly Pickering		

REVISION/CHECKING HISTORY

Version Number	Date	Issued By		Checked By	
1 Report	03.10.2017	ES		PAK	
2 Updated Report	19.02.2021	ES		PAK	
3					
4					
5					
6					

DISTRIBUTION RECORD

[illegible]

CONTENTS	PAGE
1.0 INTRODUCTION.....	2
1.1 STUDY BRIEF	2
1.2 SITE DESCRIPTION	2
1.3 PROPOSED DEVELOPMENT	2
2.0 RELEVANT NOISE CRITERIA.....	3
2.1 EXTERNAL NOISE CRITERIA	3
2.2 EDUCATIONAL PRECINCT	4
2.3 QDC MP4.4 NOISE CATEGORIES	6
3.0 TRAFFIC NOISE IMPACT ASSESSMENT	7
3.1 TRAFFIC NOISE ASSESSMENT	7
3.1.1 Traffic Volume Data.....	7
3.1.2 Predicted Future Traffic Noise Levels – Residential Outdoor Areas	7
3.1.3 Predicted Future Traffic Noise Levels – QDC MP4.4 Noise Categories ..	9
3.1.4 Predicted Future Traffic Noise Levels – Educational External Façade	9
3.1.5 Predicted Future Traffic Noise Levels – Educational Outdoor Areas	9
4.0 CONCLUSIONS.....	11

FIGURES

ATTACHMENTS

1.0 INTRODUCTION

1.1 STUDY BRIEF

MWA Environmental has been engaged to prepare an updated Traffic Noise Impact Assessment for the proposed “Precinct 4 – ROL1” previously known as “Precinct 5” development at Yarrabilba.

The report has assessed the potential road traffic noise impact and mitigation measures associated with the Arterial Road and Major Collector Road corridors within the Yarrabilba P4 development area based on updated lot reconfiguration plan and civil earthworks design.

Based upon standard traffic noise assessment methodology and 10 Year Planning Horizon traffic forecasts, this assessment has been conducted using computer noise modelling of the road traffic volumes on the Arterial and Major Collector Roads as part of Yarrabilba development, and considering the following:

- Preliminary ground level contours for Precinct 4 by KN Group;
- Preliminary civil works levels for the ultimate Arterial and Major Collector Road corridors provided by KN Group; and
- Updated planning horizon traffic design data to Year 2032 for the road corridors as advised by SLR (email correspondence).

1.2 SITE DESCRIPTION

The proposed Precinct 4 development is located in the southern eastern portion of the overall Yarrabilba development. The site location is shown on **Figure 1**.

The Arterial Road corridor (Town Centre East-West Road) divides Precinct 4 with residential allotments located to the eastern and western side of the road as well as an educational precinct.

1.3 PROPOSED DEVELOPMENT

The proposed overall Precinct 4 development comprises approximately 673 residential allotments with the educational precinct, associated internal road network, open space and balance lots.

The development plan is shown on **Figure 2**.

2.0 RELEVANT NOISE CRITERIA

2.1 EXTERNAL NOISE CRITERIA

The Logan Planning Scheme 2015 requirements for the assessment and mitigation of road traffic noise from Council-controlled roadways are limited to regulation of the acoustic treatment of houses within designated ‘transport noise corridors’ through the Queensland Development Code. There are no external traffic noise criteria in the current Logan Planning Scheme 2015 and there does not appear to be a specific requirement for assessment of road traffic noise for a reconfiguration of lot adjacent to a road that is not a designated ‘transport noise corridor’.

Logan City Council has gazetted transport noise corridors under the Building Act 1975 which provides for the regulation of the acoustic treatment of dwellings affected by road traffic noise in accordance with Queensland Development Code Mandatory Part 4.4 ‘*Buildings in a transport noise corridor*’ (“**MP4.4**”). This process is managed by private certifiers based upon overlay mapping managed by the Queensland Department of Housing and Public Works.

The Arterial and Major Collector road corridors are not currently gazetted as a transport noise corridor but is likely to be at some stage in the future if and when traffic volumes exceed 5,000 vehicles per day. Until such time as the road corridors is gazetted as a ‘transport noise corridor’ there is unlikely to be a requirement for acoustic treatment of houses in proximity to the road. There is the potential that houses may already be constructed on allotments adjacent to the road prior to a ‘transport noise corridor’ being gazetted and thus no acoustic treatment requirements would be applied.

This notwithstanding, this assessment has addressed the methodology and criteria of the TMR *Road Traffic Noise Management: Code of Practice* and Queensland Development Code (QDC) *MP4.4 – Buildings in a Transport Noise Corridor and State Code 1: Development in a state-controlled road environment (SDAP)*. The assessment has considered what noise levels would be experienced at the backyard of the proposed allotments to comply with a 60 dB(A) L₁₀ 18 hour noise limit typically applied by the more recent SDAP and the MP4.4 ‘noise categories’ (which define standard of acoustic treatment required) that would be expected within a transport noise corridor if gazetted after completion.

The relevant criteria for the assessment of noise impacts are outlined in *State Code 1: Development in a state-controlled road environment*, as follows:

Performance outcomes	Acceptable outcomes
Noise	
Accommodation activities	
PO23 Development involving an accommodation activity or land for a future accommodation activity minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in habitable rooms.	AO23.1 A noise barrier or earth mound is provided which is designed, sited and constructed: - to meet the following external noise criteria at all facades of the building envelope: ≤60 dB(A) L₁₀ (18 hour) façade corrected (measured L₉₀ (8 hour) free field between 10pm and 6am ≤40 dB(A)) ≤63 dB(A) L₁₀ (18 hour) façade corrected (measured L₉₀ (8 hour) free field between 10pm and 6am >40 dB(A)) - in accordance with chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013.
PO24 Development involving an accommodation activity or land for a future accommodation activity minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in outdoor spaces for passive recreation.	AO24.1 A noise barrier or earth mound is provided which is designed, sited and constructed: - to meet the following external noise criteria in outdoor spaces for passive recreation: ≤57 dB(A) L₁₀ (18 hour) free field (measured L₉₀ (18 hour) free field between 6am and 12 midnight ≤45 dB(A)) ≤60 dB(A) L₁₀ (18 hour) free field (measured L₉₀ (18 hour) free field between 6am and 12 midnight >45 dB(A)) - in accordance with chapter 7 integrated noise barrier design of the Transport Noise Management Code of Practice – Volume 1 Road Traffic Noise, Department of Transport and Main Roads, 2013. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the State Development Assessment Provisions Supporting Information – Community Amenity (Noise), Department of Transport and Main Roads, 2013.

2.2 EDUCATIONAL PRECINCT

The proposed Lot 5080 within Precinct 4 includes land use dedicated to future educational precinct within the Yarrabilba development. The relevant criteria for the assessment of noise impacts are outlined in *State Code 1: Development in a state-controlled road environment*, as follows:

Performance outcomes	Acceptable outcomes
Child care centres and educational establishments PO25 Development involving a: 1. child care centre; or 2. educational establishment minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in indoor education areas and indoor play areas.	AO25.1 A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria at all facades of the building envelope: a. ≤ 58 dB(A) L_{10} (1 hour) façade corrected (maximum hour during normal opening hours) 2. in accordance with chapter 7 – Integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the State Development Assessment Provisions Supporting Information – Community Amenity (Noise), Department of Transport and Main Roads, 2013. If the building envelope is unknown, the deemed-to-comply setback distances for buildings stipulated by the local planning instrument or relevant building regulations should be used. OR all of the following acceptable outcomes apply: AO25.2 Buildings which include indoor education areas and indoor play areas are setback the maximum distance possible from a state-controlled road or type 1 multi-modal corridor. AND AO25.3 Buildings are designed and oriented so that indoor education areas and indoor play areas are located furthest from the state-controlled road or type 1 multi-modal corridor. AND AO25.4 Buildings are designed and constructed using materials which ensure indoor education areas and indoor play areas meet the following internal noise criteria: 1. ≤ 35 dB(A) L_{eq} (1 hour) (maximum hour during opening hours). Statutory note: Noise levels from a state-controlled road or type 1 multi-modal corridor are to be measured in accordance with AS1055.1–1997 Acoustics – Description and measurement of environmental noise. AO26.1 A noise barrier or earth mound is provided which is designed, sited and constructed: 1. to meet the following external noise criteria in each outdoor education area or outdoor play area: a. ≤ 63 dB(A) L_{10} (12 hour) free field (between 8am and 8pm) 2. in accordance with chapter 7 – Integrated noise barrier design of the Transport Noise Management Code of Practice: Volume 1 (Road Traffic Noise), Department of Transport and Main Roads, 2013. Note: To demonstrate compliance with the acceptable outcome, it is recommended that a RPEQ certified noise assessment report is provided, prepared in accordance with the State Development Assessment Provisions Supporting Information – Community Amenity (Noise), Department of Transport and Main Roads, 2013. OR AO26.2 Each outdoor education area and outdoor play area is shielded from noise generated from a state-controlled road or type 1 multi-modal corridor by a building, solid gap-free fence, or other solid gap-free structure.
PO26 Development involving a: 1. child care centre; or 2. educational establishment minimises noise intrusion from a state-controlled road or type 1 multi-modal corridor in outdoor education areas and outdoor play areas.	

2.3 QDC MP4.4 NOISE CATEGORIES

Since implementation in August 2010, assessment of internal road traffic noise amenity (i.e. within habitable rooms) for dwellings adjacent to state-controlled roads is regulated by the Queensland Development Code (QDC) MP4.4 *Buildings in a Transport Noise Corridor* (“**QDC MP4.4**”).

An objective of this noise assessment is to determine which QDC MP4.4 noise categories are appropriate for proposed allotments. Under MP4.4 the specific acoustic treatment requirements for proposed dwellings are dependent upon the noise exposure category of the building site, as follows:

Table 1: Summary of QDC MP4.4 Traffic Noise Categories

QDC MP4.4 Noise Category	L ₁₀ 18 hour* for state-controlled roads
Category 4	≥ 73 dB(A)
Category 3	68 – 72 dB(A)
Category 2	63 – 67 dB(A)
Category 1	58 - 62 dB(A)
Category 0 (no acoustic treatment required)	≤ 57 dB(A)

* measured at 1 m from the façade of the proposed or existing building.

3.0 TRAFFIC NOISE IMPACT ASSESSMENT

3.1 TRAFFIC NOISE ASSESSMENT

In order to assess compliance with the SDAP external noise criteria, 10-year design horizon traffic noise predictions have been predicted across the site. The noise model has represented the design horizon of the development traffic on the Arterial Road and Major Collector roads based upon the design contour of the road and of Precinct 4 allotments.

The SoundPLAN 8.1 model was setup to predict the external L_{10} (18 hour) traffic noise levels under design traffic flow conditions for the Year 2032.

3.1.1 Traffic Volume Data

The design horizon traffic volumes (daily two way total) and speed limits provided by SLR are as indicated in the **Table 2** below with reference points A, B, C, D, E and F as presented in **Attachment 1**.

The 18 hour (6am to Midnight) traffic volume has been approximated as 94% of the daily volume. Heavy vehicle percentage is considered to be a conservative 5% for modelling purposes as advised by SRL.

Table 2: Design Traffic Volume Data

Planning Horizon	Road Section	Daily Vehicles Volume (AADT)	Speed (km/hr)
10 Year Design	A	21,100	60
	B	7,100	
	C	19,400	
	D	19,100	
	E	N/A	
	F	18,700	

The following describes the road section hierarchy:

- A – Yarrabilba Drive – Arterial Road
- B – Eastern Perimeter Link – Major Collector Road
- C to E – Town Centre East-West Road - Arterial Road
- F – Major Collector Road

3.1.2 Predicted Future Traffic Noise Levels – Residential Outdoor Areas

A SoundPLAN 8.1 model was setup to predict the external L_{10} (18 hour) traffic noise levels under 10 year design traffic flow conditions for Ground Level (+1.8m) and Upper Level (+4.6m) receptors *with acoustic barrier*. The recommended acoustic barrier height of **2.0 metres above the allotment earthworks design levels or on top of the retaining wall** whichever is the higher point as shown on **Figure 3**.

It is noted that some allotments are in cut or in fill with the lot pad level being in the order of 1 metre difference towards the road frontage. As such, if a barrier specified to a height of 2.0 metres above lot level were to be constructed at the top of a 1 metre height retaining wall for a in cut lot, then the actual acoustic fence structure would be 3.0 metres.

The results of the traffic noise modelling for ground level receptors within Precinct 4 indicates that the adopted SDAP noise criterion of 60 dB(A) L₁₀ (18 hour) for outdoor recreation space (backyards) will be complied with at the majority of the proposed allotments.

The results of the modelling demonstrate that, for outdoor recreation areas that do exceed the relevant criterion, it is likely that construction of the dwelling may achieve compliance with the noise criteria due to further shielding from the future dwelling. Alternatively, specific design features (e.g. more shielded locations, operable walls/louvres to shield road traffic noise) may be incorporated in order to comply with the 60 dB(A) L₁₀ (18 hour) noise amenity criteria for outdoor recreational areas. The outdoor recreational spaces this solution can be considered for are the allotments listed below and shown on **Figure 4**:

- Lot 1;
- Lot 22;
- Lot 452;
- Lot 460; and
- Lots 760 and 761.

As such, outdoor recreational spaces for future dwellings on the Lots described above may be designed to incorporate either:

1. A covered outdoor recreation space (e.g. patio / deck) set into a rear corner of the dwelling with an operable wall/louvre (or similar) along the trafficable lane façade which can be closed by residents during higher traffic noise periods if desired (see **Diagram A** below); or
2. An outdoor recreation area on the front façade of the dwelling (located at front façade facing access road) (see **Diagram B** below); or
3. A more centrally located outdoor recreational area in the form of courtyard to maximise building façade shielding (see **Diagram C** below).

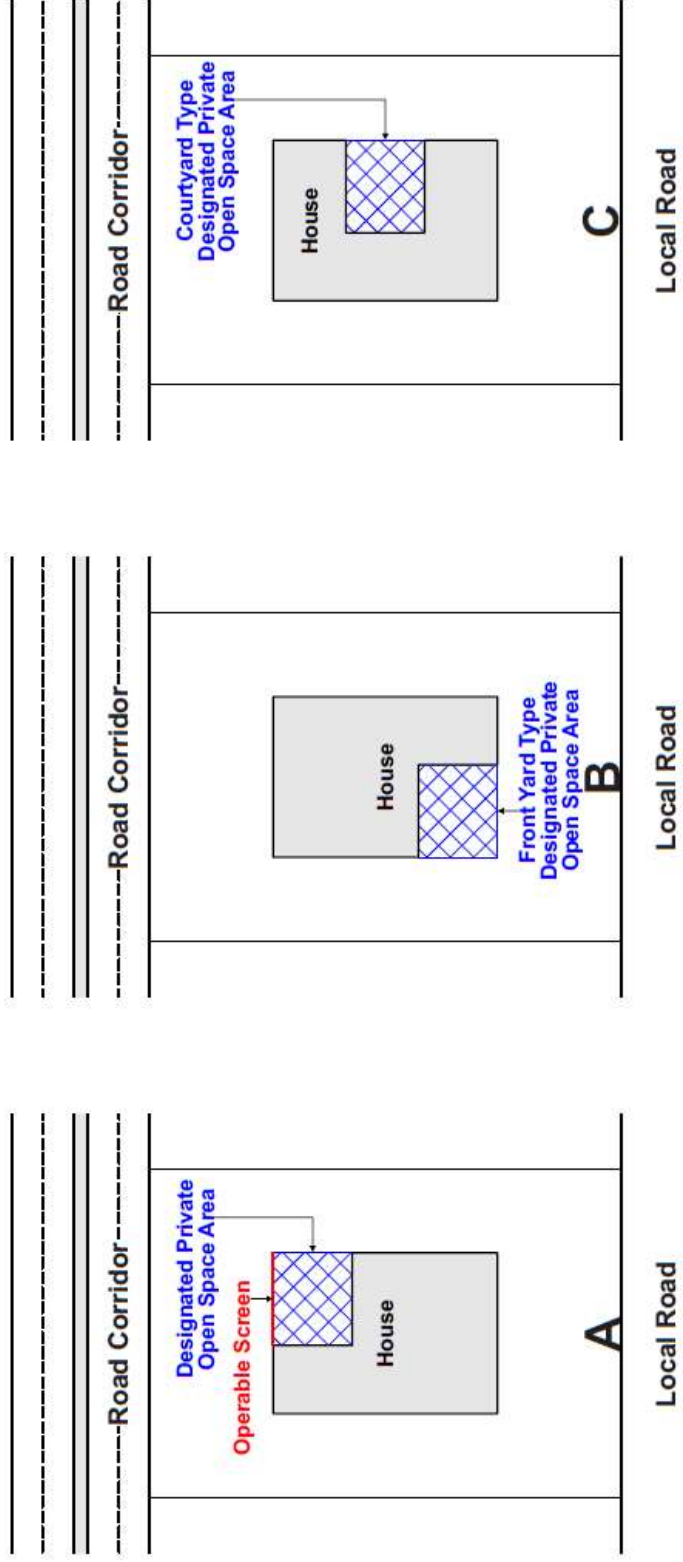


Diagram A – Rear Acoustic Screen **Diagram B - Front Shielded** **Diagram C – Courtyard Configuration**

With the above design feature(s) residents will have access to outdoor recreation space that is compliant with the relevant external noise amenity criteria.

The predicted road traffic noise contour maps for compliance of the 60 dB(A) L₁₀ (18 hour) outdoor spaces are provided in **Attachment 2**.

3.1.3 Predicted Future Traffic Noise Levels – QDC MP4.4 Noise Categories

Under the *Building Act 1975*, the transport Chief Executive may designate land as being within a transport noise corridor and compliance with QDC MP4.4 is required if the land is within:

- 100 metres of a state-controlled road; or
- Up to 250 metres of a state-controlled road if the noise of traffic on the road is at least 58 dB(A).

Effectively, for the purposes of land use planning assessment and the design of future dwellings in accordance with the QDC, acoustic treatment may be required for dwellings located within 250 metres of the roadway if external L₁₀ (18 hour) noise levels exceed 58 dB(A). This notwithstanding, it is noted that this may occur some stage in the future under an ultimate design horizon or when the Southern Infrastructure Corridor is commissioned, however it is expected that up to and after Year 2032 the land within 100 metres of the Arterial Road and Major Collector Road would at some time be designated as being within a transport noise corridor.

In the event that major roads were to be gazetted as a 100 metre transport noise corridor then, based upon our 2032 modelling for Precinct 4, single-storey dwellings adjoining the road corridor boundaries would be subject to QDC MP4.4 ‘Noise Category 1 and 2’ acoustic treatment requirements.

For the upper level of any two-storey houses within Precinct 4 a maximum 'Noise Category 3' acoustic treatment requirement would apply.

Table 3 below presents the affected allotments within a 100 metre transport corridor and the applicable QDC MP4.4 noise categories for any future single or two storey dwellings on the allotment within Precinct 4.

A copy of the Queensland Development Code (QDC) *MP4.4 – Buildings in a Transport Noise Corridor* is included in **Attachment 3** including indicative acceptable forms of construction.

Table 3: **Recommended QDC MP4.4 'Noise Categories' for 'Precinct 4'**
Allotments

QDC MP4.4 Noise Categories PRECINCT 4		
Lot #	Single storey house / ground floor	Upper floor of two storey house
1	Category 2	Category 3
2	Category 1	Category 2
3	Category 1	Category 1
4	Category 1	Category 1
5	Category 0	Category 1
6	Category 0	Category 1
17	Category 0	Category 1
18	Category 0	Category 1
19	Category 1	Category 1
20	Category 1	Category 1
21	Category 1	Category 2
22	Category 2	Category 3
23	Category 1	Category 3
24	Category 1	Category 3
25	Category 0	Category 1
26	Category 0	Category 0
27	Category 0	Category 0
165	Category 0	Category 0
166	Category 0	Category 0
167	Category 0	Category 0
168	Category 0	Category 0
169	Category 0	Category 0
170	Category 0	Category 0
171	Category 0	Category 0
172	Category 0	Category 0
180	Category 0	Category 0
181	Category 0	Category 1
182	Category 0	Category 1
183	Category 1	Category 3
184	Category 1	Category 3

Table 3 – Continued

QDC MP4.4 Noise Categories PRECINCT 4		
Lot #	Single storey house / ground floor	Upper floor of two storey house
185	Category 1	Category 3
186	Category 1	Category 3
187	Category 1	Category 3
188	Category 1	Category 3
189	Category 1	Category 3
190	Category 1	Category 3
191	Category 1	Category 3
192	Category 1	Category 3
193	Category 1	Category 3
194	Category 1	Category 3
193	Category 1	Category 3
194	Category 1	Category 3
195	Category 1	Category 3
196	Category 1	Category 3
197	Category 1	Category 3
198	Category 1	Category 3
199	Category 1	Category 3
200	Category 1	Category 3
201	Category 1	Category 3
202	Category 1	Category 3
204	Category 1	Category 3
205	Category 1	Category 3
206	Category 1	Category 3
207	Category 1	Category 3
208	Category 1	Category 1
209	Category 0	Category 1
210	Category 0	Category 0
211	Category 0	Category 0
213	Category 0	Category 1
214	Category 0	Category 1
215	Category 0	Category 1
216	Category 0	Category 1
217	Category 0	Category 1
218	Category 0	Category 1
219	Category 0	Category 1
220	Category 0	Category 1
221	Category 0	Category 1
222	Category 0	Category 1
230	Category 2	Category 2
231	Category 0	Category 1
262	Category 0	Category 0
263	Category 0	Category 1

Table 3 – Continued

QDC MP4.4 Noise Categories PRECINCT 4		
Lot #	Single storey house / ground floor	Upper floor of two storey house
416	Category 1	Category 1
430	Category 2	Category 2
431	Category 2	Category 2
432	Category 2	Category 2
433	Category 2	Category 2
434	Category 2	Category 2
435	Category 2	Category 2
436	Category 2	Category 2
437	Category 2	Category 2
438	Category 2	Category 2
439	Category 1	Category 1
440	Category 1	Category 1
441	Category 1	Category 1
442	Category 1	Category 1
443	Category 0	Category 1
444	Category 0	Category 1
445	Category 0	Category 1
446	Category 0	Category 1
452	Category 2	Category 3
453	Category 1	Category 2
454	Category 1	Category 2
455	Category 1	Category 1
456	Category 0	Category 1
457	Category 0	Category 1
458	Category 1	Category 1
459	Category 1	Category 2
460	Category 2	Category 3
461	Category 1	Category 3
462	Category 1	Category 2
463	Category 1	Category 2
464	Category 1	Category 1
465	Category 1	Category 1
760	Category 2	Category 3
761	Category 1	Category 2
762	Category 1	Category 2
763	Category 1	Category 1
764	Category 1	Category 1

The SoundPLAN model predictions are presented as plots of predicted Year 2032 L₁₀ (18 hour) traffic noise levels (including +2.5dB façade reflection) over the proposed residential subdivision for ground level (+1.8m) receptors (refer **Attachment 4**).

The SoundPLAN model predictions are also presented as plots of predicted Year 2032 L₁₀ (18 hour) traffic noise levels (including +2.5dB façade reflection) over the proposed residential subdivision for upper level (+4.6m) receptors (refer **Attachment 5**).

3.1.4 Predicted Future Traffic Noise Levels – Educational External Façade

Traffic noise predictions have been made across to the proposed educational land (Lot 5080) within Precinct 4 for a Year 2032 design horizon. The traffic noise modelling has considered the potential setback distance required for future educational buildings and outdoor educational areas without any acoustic barrier. The assessment has also considered potential acoustic treatment to educational building to achieve acceptable internal levels.

Preliminary road traffic noise modelling indicates that to achieve AO25.1 of the State Code 1 as the external noise criteria, any future educational buildings will require to be setback approximately 65 metres from the western boundary of the site to have compliance with 58 dB(A) $L_{10(1 \text{ hour})}$ façade corrected (maximum hour during normal opening hours). The graphical noise contour of the predicted Year 2032 traffic noise levels for compliance with 58 dB(A) $L_{10(1 \text{ hour})}$ façade corrected are presented in **Attachment 6**.

Given that the setback distance required to achieve 58 dB(A) $L_{10(1 \text{ hour})}$ encompasses approximately 1/3 of the site, it is considered more appropriate to demonstrate compliance with internal noise levels as per AO25.4 of the State Code 1 so that future educational buildings can be constructed along the transport noise corridor. To achieve AO25.4, a SoundPLAN 8.1 model was setup to predict the external $L_{eq(1 \text{ hour})}$ traffic noise levels under ultimate design horizon (Year 2032) traffic flow conditions.

As SoundPLAN predicts traffic noise levels as $L_{10(1 \text{ hour})}$, predictions were converted to the relevant $L_{eq(1 \text{ hour})}$ noise levels. Generally, conversion factor are based upon recorded noise level statistics at site, however due to no existing uses at present and noise ambient noise measurements conducted, application of the conversion factor are as follows based upon standard procedure as follows:

$$L_{eq(1 \text{ hour})} = L_{10(1 \text{ hour})} - 3 \text{ dB(A)}$$

The SoundPLAN modelling results demonstrate that maximum noise level of 67 dB(A) $L_{eq(1 \text{ hr})}$ will be experienced at the western boundary of the educational precinct. Therefore, minimum sound transmission loss of 32 dB(A) is required for any future educational building constructed along the transport noise corridor.

The graphical noise contour of the predicted Year 2032 traffic noise levels are presented in **Attachment 6**.

3.1.5 Predicted Future Traffic Noise Levels – Educational Outdoor Areas

Road traffic noise modelling was conducted to assess compliance requirements against AO26.1 noise criteria of the State Code 1 for outdoor educational areas. Any future outdoor education area or outdoor play area is required to meet the external noise criteria of 63 dB(A) $L_{10(12 \text{ hour})}$ free field (between 6am and 6pm).

The SoundPLAN noise contour plots of the educational outdoor areas as presented in **Attachment 7** indicates that a minimum setback distance of approximately 15 metres from the western boundary of the site is require to achieve compliance without the need for any acoustic barriers.

The road traffic noise modelling of the educational precinct demonstrates that:

1. No acoustic barrier is considered at the proposed Lot 5080 educational land.
2. Noise prediction modelling indicates that to achieve the Acceptable Outcome AO25.1 of the State Code 1 as the external noise criteria, any future educational buildings will require to be setback approximately 65 metres from the western boundary of the site.
3. Given that the setback distance required to achieve 58 dB(A) L_{10} (1 hour) as per AO25.1 encompasses approximately 1/3 of the site, it is considered more appropriate to demonstrate compliance with internal noise levels as per AO25.4, so that building can be located closer to the transport road corridor.
4. In order to achieve the AO 25.4 requirements within indoor educational rooms, any future educational building located along the transport noise corridor will need to be acoustically treated. Acoustic treatment is required for all building facades to achieved minimum sound transmission losses of **32 dB(A)**, which in accordance with QDC MP4.4 is up to Noise Category 3 for façade closest to the road transport corridor.
5. Noise prediction modelling for educational outdoor areas indicates that a setback distance of approximately 15 metres from the western boundary of the site is required to achieve compliance without the need for any acoustic barriers.

4.0 CONCLUSIONS

MWA Environmental has been engaged by Lend Lease to prepare a Traffic Noise Impact Assessment for the proposed 'Precinct 4 – ROL1' previously referred to as 'Precinct 5' residential and educational development within the Yarrabilba estate development.

The report has assessed the potential road traffic noise impact and mitigation measures associated with the Arterial Road and Major Collector Road corridors within the Yarrabilba P4 development area based on updated lot reconfiguration plan and civil earthworks design.

The road corridors are not currently gazetted as a transport noise corridor but is likely to be at some stage in the future if and when traffic volumes exceed 5,000 vehicles per day. Until such time as the road corridor is gazetted as a 'transport noise corridor' there is unlikely to be a requirement for acoustic treatment of houses in proximity to the road. There is the potential that houses may already be constructed on allotments adjacent to the road prior to a 'transport noise corridor' being gazetted and thus no acoustic treatment requirements would be applied.

This notwithstanding, this assessment has addressed the methodology and criteria of the TMR *Road Traffic Noise Management: Code of Practice, State Code 1: Development in a state-controlled road environment (SDAP)* and Queensland Development Code (QDC) *MP4.4 – Buildings in a Transport Noise Corridor*.

The assessment has considered what noise levels would be experienced at the backyard of the proposed allotments to comply with a 60 dB(A) L₁₀ 18 hour noise limit typically applied and the MP4.4 'noise categories' (which define standard of acoustic treatment required) would be expected within a transport noise corridor if gazetted after completion.

The results of the traffic noise model for outdoor areas within Precinct 4 indicates that the adopted noise criterion of 60 dB(A) L₁₀ (18 hour) for outdoor recreation space (backyards) will achieve compliance at majority of the proposed allotment with the inclusion of acoustic barriers at height of **2.0 metres above the allotment earthworks design levels or on top of the retaining wall**, whichever is the higher point as shown on **Figure 3**.

The results of the modelling demonstrate that, for outdoor recreation areas that do exceed the relevant criterion, it is likely that with construction of the dwelling may compliance with the noise criteria due to further shielding from the future dwelling. Alternatively, specific design features (e.g. more shielded locations, operable walls/louvres to shield road traffic noise) may be incorporated in order to comply with the 60 dB(A) L₁₀ (18 hour) noise amenity criteria for outdoor recreational areas. The outdoor recreational spaces this solution can be considered is for are the allotments listed below and shown on **Figure 4**:

- Lot 1;
- Lot 22;
- Lot 452;
- Lot 460; and
- Lots 760 and 761.

As such, outdoor recreational spaces for future dwellings on the Lots described above may be designed to incorporate either:

1. A covered outdoor recreation space (e.g. patio / deck) set into a rear corner of the dwelling with an operable wall/louvre (or similar) along the trafficable lane façade which can be closed by residents during higher traffic noise periods if desired (see **Diagram A** of report); or
2. An outdoor recreation area on the front façade of the dwelling (located at front façade facing access road) (see **Diagram B** of report); or
3. A more centrally located outdoor recreational area in the form of courtyard to maximise building façade shielding (see **Diagram C** of report).

In the event that major roads were to be gazetted as a 100 metre transport noise corridor then, based upon our 2032 modelling for Precinct 4, single-storey dwellings adjoining the road corridor boundaries would be subject to QDC MP4.4 'Noise Category 1 and 2' acoustic treatment requirements. For the upper level of any two-storey houses within Precinct 4 a maximum 'Noise Category 3' acoustic treatment requirements would apply.

Table 3 of this report presents the affected allotments and the applicable QDC MP4.4 noise categories for any future single or double storey dwellings on the allotment within Precinct 4.

Traffic noise predictions have been made across to the proposed educational land (Lot 5080) within Precinct 4 for a Year 2032 design horizon. The road traffic noise modelling of the educational precinct demonstrates that:

1. No acoustic barrier is considered at the proposed Lot 5080 educational land.
2. Noise prediction modelling indicates that to achieve the Acceptable Outcome AO25.1 of the State Code 1 as the external noise criteria, any future educational buildings will require to be setback approximately 65 metres from the western boundary of the site.
3. Given that the setback distance required to achieve 58 dB(A) L_{10} (1 hour) as per AO25.1 encompasses approximately 1/3 of the site, it is considered more appropriate to demonstrate compliance with internal noise levels as per AO25.4, so that building can be located closer to the transport road corridor.

- 4. In order to achieve the AO 25.4 requirements within indoor educational rooms, any future educational building located along the transport noise corridor will need to be acoustically treated. Acoustic treatment is required for all building facades to achieved minimum sound transmission losses of **32 dB(A)**, which in accordance with QDC MP4.4 is up to Noise Category 3 for façade closest to the road transport corridor.
- 5. Noise prediction modelling for educational outdoor areas indicates that a setback distance of approximately 15 metres from the western boundary of the site is require to achieve compliance without the need for any acoustic barriers.

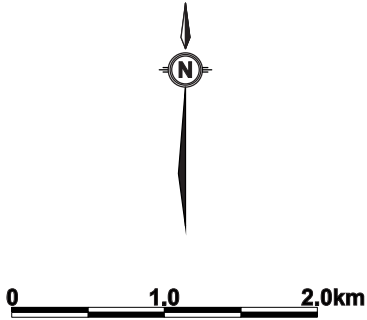
MWA Environmental
19 February 2021

FIGURES



LEGEND
— PROPERTY BOUNDARY
— SITE BOUNDARY - PRECINCT 4

DRAWING REFERENCES
© THE STATE OF QUEENSLAND QLDGLOBE



CLIENT **LENDELEASE**

PROJECT
**TRAFFIC NOISE
IMPACT ASSESSMENT
PROPOSED RESIDENTIAL
DEVELOPMENT
PRECINCT 4
YARRABILBA QLD**

TITLE
SITE LOCATION

JOB	YARRABILBA	FIGURE 1
JOB NO.	17-051	DRAWING NUMBER
DATE	22/02/21	17-051-1
SCALE	1:70,000 (A4)	
REV.		



Max Winders & Associates Pty Ltd tas MWA Environmental
Level 15, 241 Adelaide St, Brisbane. GPO BOX 3137, Brisbane Qld 4001
P 07 3002 5500 F 07 3002 5588 E mail@mwaenviro.com.au
W www.mwaenviro.com.au
ABN 94 010 833 084

PRECINCT 4 BOUNDARY
APPLICATION ONE
STAGE BOUNDARY

OPEN SPACE
EDUCATION
LOCAL STAGE ROAD
VILLAGE ROAD
ARTERIAL ROAD
PATHWAY CONNECTION

LAND USE	AREA (ha)
Residential	27.94 ha
Education	7.03 ha
Open Space	3.68 ha
Road - Major Road	9.07 ha
Road - Collector Road	2.66 ha
Road - Local Street	12.74 ha
TOTAL	63.12 ha

MINIMUM RESIDENTIAL DENSITY - 44.36 ha
673 dw
15.2 dw/ha
MAXIMUM RESIDENTIAL DENSITY - 44.36 ha
709 dw
16.0 dw/ha

LOT YIELD			LOT AREA		
Lot Type	No. Lots	% Total Lots	Average Size	% of Total Area	Area
T1	21	3.12%	660m²	4.96%	13866m²
T3	13	1.93%	604m²	2.81%	7858m²
C2	126	18.72%	470m²	21.20%	59234m²
C3	56	8.32%	524m²	10.51%	29372m²
PV	137	20.36%	410m²	20.14%	56265m²
V	77	11.44%	340m²	9.38%	26199m²
TT3	1	0.15%	469m²	0.17%	469m²
TCY2	57	8.47%	377m²	7.70%	21517m²
TCY3	41	6.09%	425m²	6.25%	17454m²
TPV	47	6.98%	334m²	5.63%	15737m²
TV	44	6.54%	271m²	4.28%	11955m²
TCF	27	4.01%	229m²	2.22%	6201m²
TCD	8	1.19%	212m²	0.61%	1703m²
MFS	18	2.67%	640m²	4.13%	11528m²
Total Number of Lots	673				

NOTE:
MINIMUM DWELLINGS is based on the development of one dwelling on each single family and multi-family strata (MFS) lot.
MAXIMUM DWELLINGS is based on the development of one dwelling on each single family lot, and three dwellings on each multi family strata (MFS).

DENSITY calculations include the area of residential lots, local roads and credited neighbourhood park. The boundaries, roads and pathways shown hereon are subject to detailed engineering design, final survey and approval of subsequent development applications by the relevant authorities.

PRECINCT FOUR - APPLICATION ONE
RECONFIGURATION OF A LOT

NOTE: This plan is indicative only, and specific uses, road alignment, boundaries, setbacks, and building layout shown may vary due to detailed design consideration. © 2021 Lendlease Communities (Australia). All rights reserved. Except as permitted by Lendlease, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a database or retrieval system, without the permission of Lendlease.

CLIENT

LENLEASE

PROJECT

TRAFFIC NOISE
IMPACT ASSESSMENT
PROPOSED RESIDENTIAL
DEVELOPMENT
PRECINCT 4
YARRABILBA QLD

TITLE

PRECINCT 4
SITE PLAN

JOB

YARRABILBA

FIGURE 2

JOB NO.

17-051

DATE

22/02/21

DRAWING NUMBER

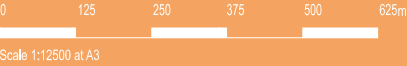
SCALE

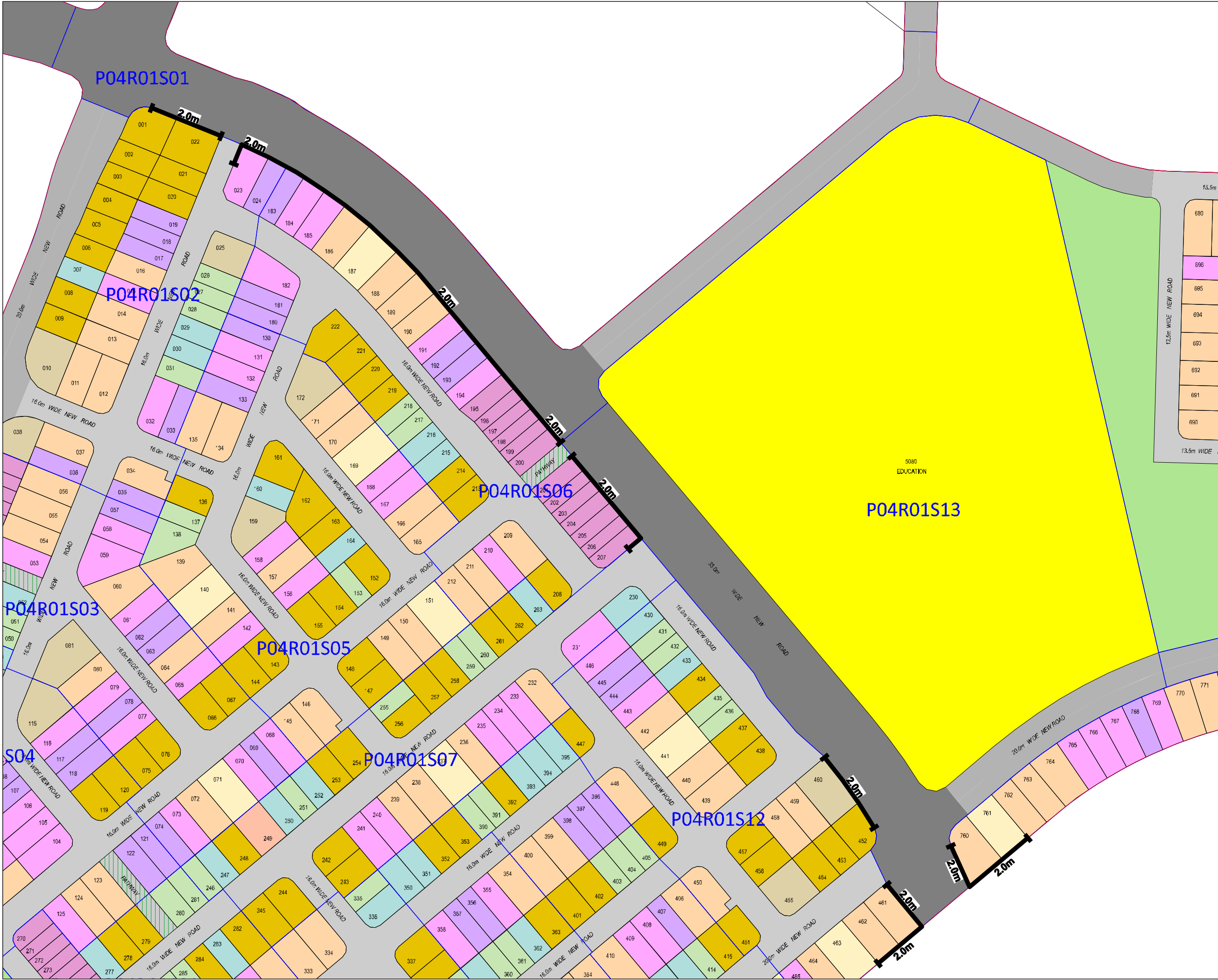
1:12500 (A3)

17-051-2

REV.

Max Winders & Associates Pty Ltd tas MWA Environmental
Level 15, 241 Adelaide St, Brisbane. GPO BOX 3137, Brisbane Qld 4001
P 07 3002 5500 F 07 3002 5588 E mail@mwaenviro.com.au
W www.mwaenviro.com.au
ABN 94 010 833 084





LEGEND
 2.0m BARRIER HEIGHT
ACOUSTIC BARRIER

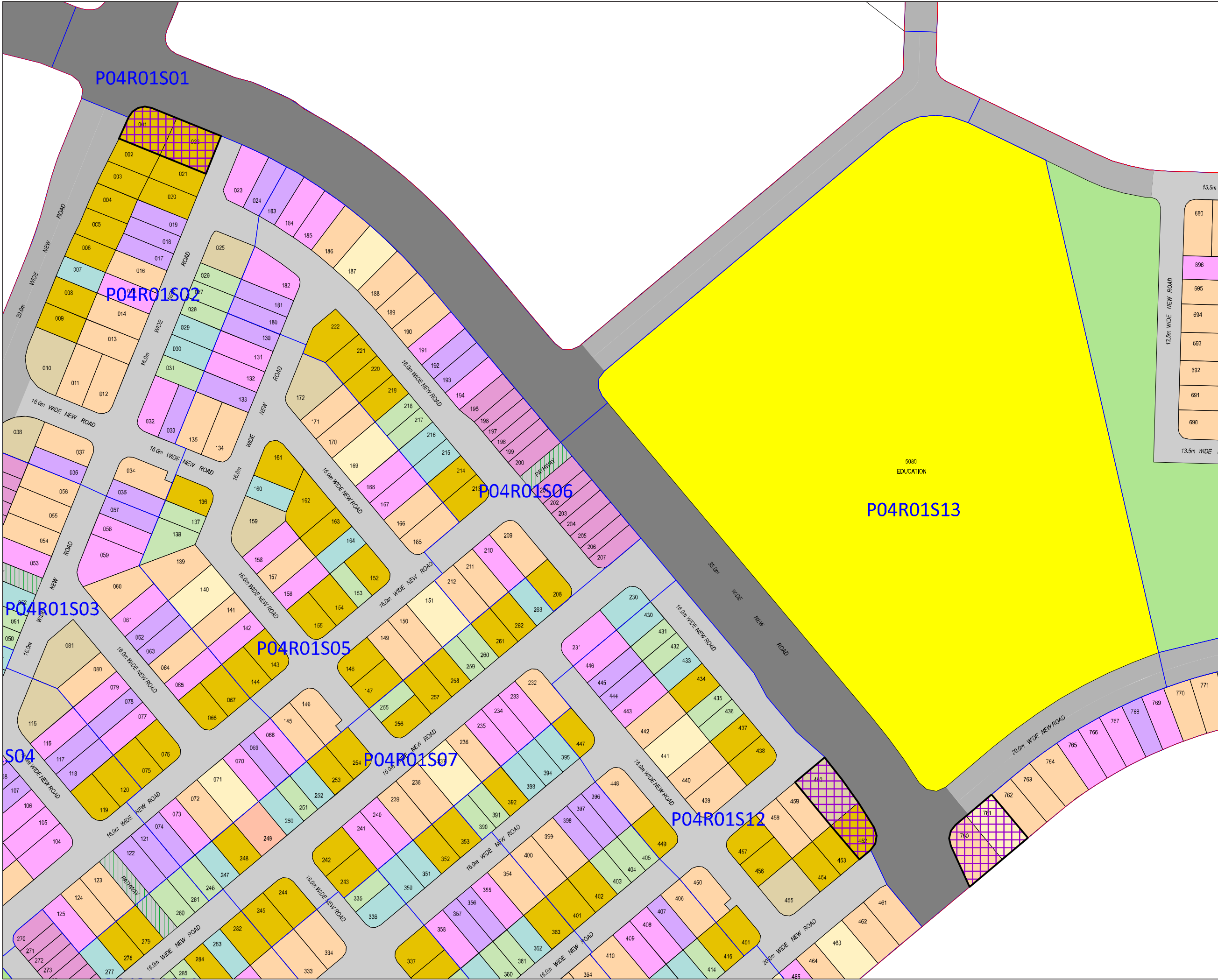
DRAWING REFERENCE
LENDEASE PLAN, PRECINCT FOUR,
APPLICATION ONE, RECONFIGURATION OF A LOT,
DGN NO. YAR P04-ROL1 210209 SHT 1 OF 9

0 20 40 60 80m

CLIENT LENDEASE
PROJECT TRAFFIC NOISE
IMPACT ASSESSMENT
PROPOSED RESIDENTIAL
DEVELOPMENT
PRECINCT 4
YARRABILBA QLD
TITLE ACOUSTIC BARRIER
LOCATIONS

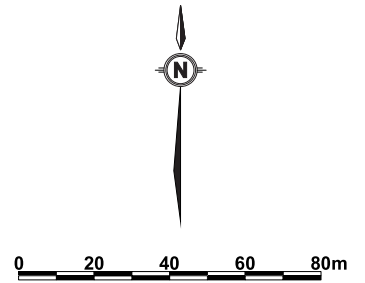
JOB	YARRABILBA	FIGURE 3
JOB NO.	17-051	
DATE	22/02/21	DRAWING NUMBER
SCALE	1:2000 (A3)	17-051-3
REV.		

Max Winders & Associates Pty Ltd t/as MWA Environmental
Level 15, 241 Adelaide St, Brisbane. GPO BOX 3137, Brisbane Qld 4001
P 07 3002 5500 F 07 3002 5588 E mail@mwaenviro.com.au
W www.mwaenviro.com.au
ABN 94 010 833 084



LEGEND
 ALLOTMENTS REQUIRING DESIGNATED PRIVATE OPEN SPACE

DRAWING REFERENCE
LENDEASE PLAN, PRECINCT FOUR,
APPLICATION ONE, RECONFIGURATION OF A LOT,
DGN NO. YAR P04-ROL1 210209 SHT 1 OF 9



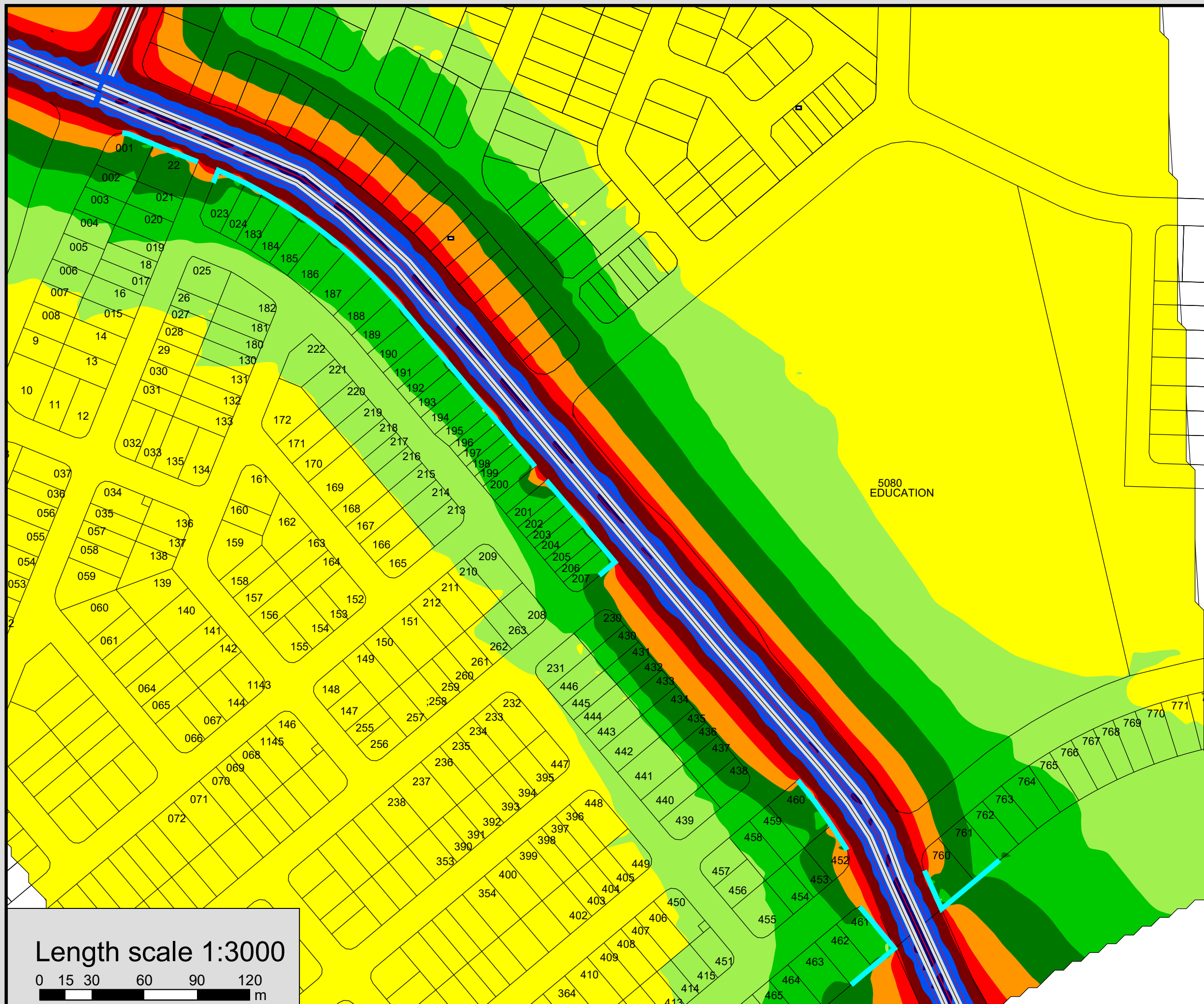
CLIENT LENDEASE		
PROJECT TRAFFIC NOISE IMPACT ASSESSMENT PROPOSED RESIDENTIAL DEVELOPMENT PRECINCT 4 YARRABILBA QLD		
TITLE ALLOTMENTS REQUIRING DESIGNATED PRIVATE OPEN SPACE		
JOB	YARRABILBA	FIGURE 4
JOB NO.	17-051	
DATE	22/02/21	DRAWING NUMBER
SCALE	1:2000 (A3)	
REV.		17-051-4

ATTACHMENT 1

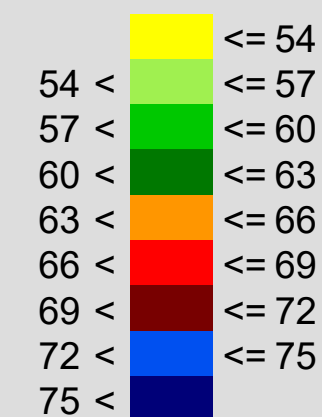
Traffic Volume Sections

Attachment 2

*SoundPLAN 8.1 Modelling
Design Horizon Traffic Noise Predictions – Outdoor Recreation Space*



Noise level
L10(18hr)
in dB(A)



Legend

- Cadastral
- Surface
- Wall
- Limit line

**Yarrabilba 16-153
Precinct 4**

Traffic Noise Levels

**Outdoor Recreational
Noise Impact With
Barriers**

February 2021



Attachment 3

QDC MP4.4 – Acceptable Solutions

Schedule 1

Noise category	Minimum <i>transport noise reduction</i> (dB (A)) required for <i>habitable rooms</i>	Component of building's <i>external envelope</i>	Minimum <i>R_w</i> required for each component
Category 4	40	Glazing	43
		External walls	52
		Roof	45
		Floors	51
		Entry doors	35
Category 3	35	Glazing	38 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			35 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	47
		Roof	41
		Floors	45
		Entry doors	33

Noise category	Minimum <i>transport noise reduction</i> (dB (A)) required for <i>habitable rooms</i>	Component of building's <i>external envelope</i>	Minimum R_w required for each component
Category 2	30	Glazing	35 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			32 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	41
		Roof	38
		Floors	45
		Entry doors	33
Category 1	25	Glazing	27 (where total area of glazing for a <i>habitable room</i> is greater than 1.8m ²)
			24 (where total area of glazing for a <i>habitable room</i> is less than or equal to 1.8m ²)
		External walls	35
		Roof	35
		Entry Doors	28
Category 0	No additional acoustic treatment required – standard building assessment provisions apply.		

Schedule 2

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
Glazing	43	Double glazing consisting of two panes of minimum 5mm thick glass with at least 100mm air gap and full perimeter <i>acoustically rated seals</i> .
	38	Minimum 14.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> ; OR Double glazing consisting of one pane of minimum 5mm thick glass and one pane of minimum 6mm thick glass with at least 44mm air gap, and full perimeter <i>acoustically rated seals</i>
	35	Minimum 10.38mm thick laminated glass, with full perimeter <i>acoustically rated seals</i> .
	32	Minimum 6.38mm thick laminated glass with full perimeter <i>acoustically rated seals</i> .
	27	Minimum 4mm thick glass with full perimeter <i>acoustically rated seals</i>
	24	Minimum 4mm thick glass with standard weather seals

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
External walls	52	Two leaves of clay brick masonry, at least 270mm in total, with subfloor vents fitted with noise attenuators.
	47	Two leaves of clay brick masonry at least 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) 50mm thick mineral insulation or 50mm thick glass wool insulation with a density of 11kg/m³ or 50mm thick polyester insulation with a density of 20kg/m³ in the cavity. OR Two leaves of clay brick masonry at last 110mm thick with: (i) cavity not less than 50mm between leaves; and (ii) at least 13mm thick cement render on each face OR Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) Mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 13mm thick fixed to outside face of studs. OR Single leaf of minimum 150mm thick masonry of hollow, dense concrete blocks, with mortar joints laid to prevent moisture bridging.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	41	Two leaves of clay brick masonry at least 110mm thick with cavity not less than 50mm between leaves OR Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³ positioned between studs; and (iii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Single leaf of brick masonry at least 110mm thick with at least 13mm thick render on each face OR Concrete brickwork at least 110mm thick OR In-situ concrete at least 100mm thick OR Precast concrete at least 100mm thick and without joints.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	35	Single leaf of clay brick masonry at least 110mm thick with: (i) a row of at least 70mm x 35mm timber studs or 64mm steel studs at 600mm centres, spaced at least 20mm from the masonry wall; and (ii) One layer of plasterboard at least 10mm thick fixed to outside face of studs OR Minimum 6mm thick fibre cement sheeting or weatherboards or plank cladding externally, minimum 90mm deep timber stud or 92mm metal stud, standard plasterboard at least 13mm thick internally.
Roof	45	Concrete or terracotta tile or sheet metal roof with sarking, <i>acoustically rated plasterboard</i> ceiling at least 13mm thick fixed to ceiling joists, cellulose fibre insulation at least 100mm thick with a density of at least 45kg/m³ in the cavity. OR Concrete or terracotta tile or sheet metal roof with sarking, 2 layers of <i>acoustically rated plasterboard</i> at least 16mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity.
	41	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling joists, glass wool insulation at least 50mm thick with a density of at least 11kg/m³ or polyester insulation at least 50mm thick with a density of at least 20kg/m³ in the cavity. OR Concrete suspended slab at least 100mm thick.
	38	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity, mineral insulation or glass wool insulation at least 50mm thick with a density of at least 11 kg/m³.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	35	Concrete or terracotta tile or metal sheet roof with sarking, plasterboard ceiling at least 10mm thick fixed to ceiling cavity.
Floors	51	Concrete slab at least 150mm thick.
	45	Concrete slab at least 100mm thick OR Tongued and grooved boards at least 19mm thick with: (i) timber joists not less than 175mm x 50mm; and (ii) mineral insulation or glass wool insulation at least 75mm thick with a density of at least 11kg/m ³ positioned between joists and laid on plasterboard at least 10mm thick fixed to underside of joists; and (iii) mineral insulation or glass wool insulation at least 25mm thick with a density of at least 11kg/m ³ laid over entire floor, including tops of joists before flooring is laid; and (iv) secured to battens at least 75mm x 50mm; and (v) the assembled flooring laid over the joists, but not fixed to them, with battens lying between the joists.
Entry Doors	35	Solid core timber not less than 45mm thick, fixed so as to overlap the frame or rebate of the frame by not less than 10mm, with full perimeter <i>acoustically rated seals</i> .
	33	Fixed so as to overlap the frame or rebate of the frame by not less than 10mm, fitted with full perimeter <i>acoustically rated seals</i> and constructed of - (i) solid core, wood, particleboard or blockboard not less than 45mm thick; and/or (ii) acoustically laminated glass not less than 10.38mm thick.

Component of building's external envelope	Minimum R_w	Acceptable forms of construction
	28	Fixed so as to overlap the frame or rebate of the frame, constructed of - (i) Wood, particleboard or blockboard not less than 33mm thick; or (ii) Compressed fibre reinforced sheeting not less than 9mm thick; or (iii) Other suitable material with a mass per unit area not less than 24.4kg/m ² ; or (iv) Solid core timber door not less than 35mm thick fitted with full perimeter <i>acoustically rated seals</i> .

Schedule 3

The objective of the *noise assessment* is to clearly demonstrate that the *noise category* that is applicable to a particular part of or entire building, or site. The criteria for determining the relevant *noise category* are given below in Table 1:

Table 1 – Noise category levels

Noise Category	Level of transport noise * ($L_{A10, 18hr}$) for State-controlled roads and designated local government roads	Single event maximum noise* (L_{Amax}) for railway land
Category 4	≥ 73 dB(A)	≥ 85 dB(A)
Category 3	68 - 72 dB(A)	80 – 84 dB(A)
Category 2	63 – 67 dB(A)	75 – 79 dB(A)
Category 1	58 - 62 dB(A)	70 - 74 dB(A)
Category 0	≤ 57 dB(A)	≤ 69 dB(A)

* measured at 1 m from the façade of the proposed building.

Noise assessment requirements – State-controlled Roads and Local Government roads:

A *noise assessment* for State-controlled roads and Local Government roads must be undertaken in accordance with the Transport Noise Management Code of Practice Volume 1 – Road Traffic Noise (Department of Transport and Main Roads, 2013).

In addition, the *noise assessment* must contain the following information as a minimum:

1) Background Information and Existing Acoustic Environment

- A brief description of the project.
- A brief description of the current noise environment.
- Documentation of noise monitoring equipment and procedures.
- A site plan showing:
 - Location of *transport noise corridor*;

Attachment 4

*SoundPLAN 8.1 Modelling
Design Horizon Traffic Noise Predictions –
Ground Level QDC MP4.4 Noise Categories*



Noise level
L10(18hr)
incl. facade reflection
in dB(A)

Noise Category 0
≤ 58.0
Noise Category 1
58.0 < ≤ 63.0
Noise Category 2
63.0 < ≤ 68.0
Noise Category 3
68.0 < ≤ 73.0
Noise Category 4
73.0 <

Legend

— Cadastral
— Road Surface

**Yarrabilba 16-153
Precinct 4**

Year 2032 Traffic Noise

**MP4.4 Noise Categories
Precinct 4**

**Ground Level Facades
With Barriers**

February 2021

Length scale 1:3500

0 20 40 80 120



ATTACHMENT 5

*SoundPLAN 8.1 Modelling
Design Horizon Traffic Noise Predictions –
Upper Level QDC MP4.4 Noise Categories*



Noise level
L10(18hr)
incl. facade reflection
in dB(A)

- Noise Category 0
≤ 58.0
- Noise Category 1
58.0 < ≤ 63.0
- Noise Category 2
63.0 < ≤ 68.0
- Noise Category 3
68.0 < ≤ 73.0
- Noise Category 4
73.0 <

Legend

- Cadastral
- Road Surface

**Yarrabilba 16-153
Precinct 4**

Year 2032 Traffic Noise

**MP4.4 Noise Categories
Precinct 4**

**Upper Level Facades
With Barriers**

February 2021

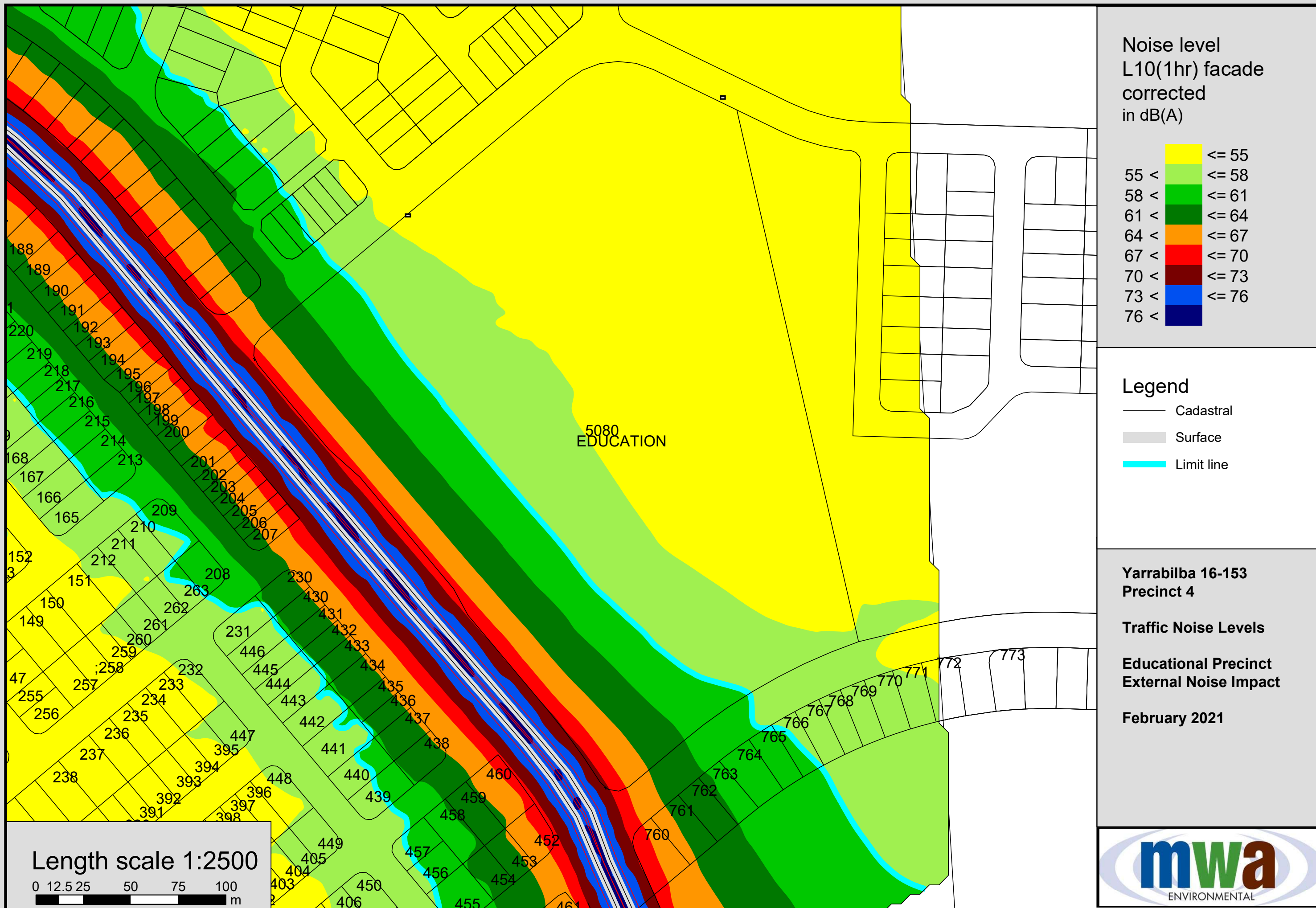
Length scale 1:3500

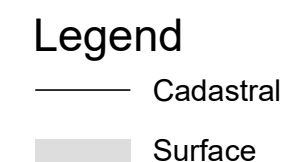
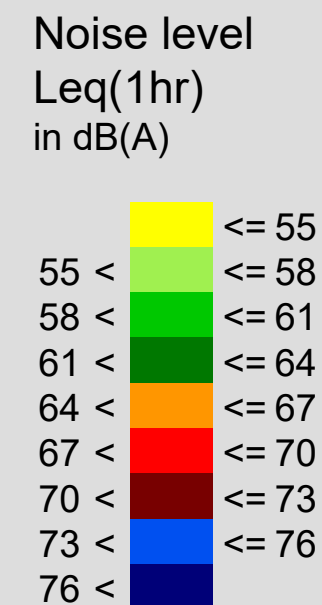
0 20 40 80 120



ATTACHMENT 6

*SoundPLAN 8.1 Modelling
Design Horizon Traffic Noise Predictions – Educational External Facade*





Yarrabilba 17-051
Precinct 4

Traffic Noise Levels

Educational Precinct
External Noise Impact

February 2021



ATTACHMENT 7

*SoundPLAN 8.1 Modelling
Design Horizon Traffic Noise Predictions – Educational Outdoor Areas*

